What is claimed is:

1. A method for manufacturing a molded multilayer article by molding a multilayer sheet consisting of a plurality of laminated polymer layers , said method comprising the steps of:

extruding a plurality of monolayers of molten polymers by forcing the molten polymers into a multiple T die combined with a plurality of T dies so that the molten polymers are extruded respectively through the T dies;

forming an intermediate molten multilayer by superposing and laminating the monolayers extruded through the T dies outside the multiple T die while the polymers are in a molten state or a semi-molten state; and

molding the intermediate molten multilayer by using a compression mold into a multilayer article of a desired shape.

2. A method for manufacturing a molded multilayer article by molding a multilayer sheet consisting of a plurality of polymer layers , said method comprising the steps of:

extruding a plurality of monolayers of molten polymers by forcing the molten polymers into a multiple T die combined with a plurality of T dies so that the molten polymers are extruded respectively through the T dies;

forming an intermediate molten multilayer by superposing and laminating the monolayers extruded through the T dies outside the multiple T die while the polymers are in a molten state or a semi-molten state;

feeding the intermediate molten multilayer to a compression mold having the bottom half mold and a top half mold by advancing the multiple T die into a space between the bottom half mold and the top half mold;

cutting the intermediate molten multilayer to a predetermined length; and

molding the intermediate molten multilayer in the compression mold into a multilayer article of a desired shape.

3. The molded multilayer article manufacturing method according to claim 2, wherein the monolayers extruded through the

T dies of the multiple T die include a first monolayer of a molten polymer serving as a skin layer, a second monolayer of a molten polymer serving as a base layer, and at least one third monolayer of a molten polymer serving as a mid-layer sandwiched between the skin layer and the base layer.

4. The molded multilayer article manufacturing method according to claim 3, wherein the first, the second and the third monolayers are of the same molten thermoplastic polymer.

5. The molded multilayer article molding manufacturing method according to claim 3, wherein the temperature of the molten polymer forced into the T die for extruding the third monolayer is lower than those of the molten polymers forced into the T dies respectively for extruding the first and the second monolayer.

6. The molded multilayer article manufacturing method according to claim 5, wherein the third monolayer is formed of a molten unfoamed polymer containing a foaming agent.

7. The molded multilayer article manufacturing method according to claim 5, wherein the thermoplastic polymer is a polyolefin.

8. The molded multilayer article manufacturing method according to claim 3, wherein each of the monolayer is extruded through the corresponding T die with a predetermined pattern of varying width.

9. The molded multilayer article manufacturing method according to claim 8, wherein the monolayer have different patterns of varying width, respectively.

10. The molded multilayer article manufacturing method according to claim 2, wherein the monolayers are laminated near the die slot openings of the T dies so that the monolayer serving as the mid-layer is sandwiched between the monolayers respectively serving

as the base layers.

11. The molded multilayer article manufacturing method according to claim 2, wherein the intermediate molten multilayer is delivered to the compression mold by cutting it into a predetermined length at a position between an open top half mold and a bottom half mold of the compression mold.

12. The molded multilayer article manufacturing method according to claim 2, wherein the intermediate molten multilayer is cut at a position below the die slot openings of the T dies of the multiple T die with respect to a direction in which the monolayers are extruded.

13. The molded multilayer article manufacturing method according to claim 2, wherein the intermediate molten multilayer is cut in a plane including an exit of a slot opening of the respective T dies.

14. The molded multilayer article manufacturing method according to claim 12, wherein a cutting process for cutting the intermediate molten multilayer comprises the steps of:

disposing a pair of pad members at a position below the die slot openings of the T dies of the multiple T die;

holding the intermediate molten multilayer between the pair of pad members;

cooling a portion of the intermediate molten multilayer held between the pair of pad members; and

cutting the intermediate molten multilayer along the cooled portion thereof.

15. The molded multilayer article manufacturing method according to claim 12, wherein a cutting process for cutting the intermediate molten multilayer comprises the steps of:

preparing and heating a cutting means;

disposing a pair of pad members at a position below the die slot openings of the T dies of the multiple T die;

holding a portion of the intermediate molten multilayer including an upstream end portion to be cut between the pair of pad members; and

shearing the intermediate molten multilayer with the cutting means while the multilayer is held between the pair of pad members.

16. The molded multilayer article manufacturing method according to claim 14 or 15, wherein air is blown from within the bodies of pad members against the intermediate molten multilayer to facilitate the separation from the pad members on completion of cutting the intermediate multilayer.

17. The molded multilayer article manufacturing method according to claim 13, wherein a cutting process comprises the steps of:

extending a metal wire in a plane intersecting a plane including the intermediate molten multilayer so as to be able to be brought into contact with end surfaces of the T dies of the multiple T die in which the die openings of the T dies open; and

moving the metal wire along the end surfaces of the T dies along the width of the intermediate molten multilayer.

18. The molded multilayer article manufacturing method according to claim 17, wherein a moving operation for moving the metal wire accompanies by heating the metal wire, and taking up a length of the metal wire.

19. The molded multilayer article manufacturing method according to claim 13, wherein a cutting operation for cutting the intermediate molten multilayer comprises the steps of:

disposing a plurality of cutting members in a plane intersecting the intermediate molten multilayer so as to be able to be brought into contact with the exit of the slot opening of the T dies of the multiple T die; and

reciprocating the cutting members along the exit of the slot opening of the T dies in directions parallel to the width of the multilayer sheet.

20. The molded multilayer article manufacturing method according to claim 19, wherein a reciprocating operation for reciprocating the cutting members comprises:

holding the cutting members in sliding contact with the exit of the slot opening of the T dies and moving the cutting members for a cutting stroke along the width of the intermediate multilayer to cut it off; and

moving the cutting members for a return stroke to their initial positions while separating the cutting members from the exit of the slot opening of the T dies.

21. The molded multilayer article manufacturing method according to claim 2, wherein the intermediate molten multilayer comprises a first monolayer sheet of a molten plastics serving as a skin layer, a second monolayer sheet of a molten plastics serving as a base layer, and at least one third monolayer sheet of an unfoamed molten plastics containing a foaming agent, serving as a mid-layer sandwiched between the skin layer and the base layer; and

said compression molding process comprises the steps of:

compressing the intermediate molten multilayer in the compression mold,

heating the compression mold to make the mid-layer produce foams,

cooling the compression mold, and

opening the compression mold and taking out a molded multilayer article from the compression mold.

22. The molded multilayer article manufacturing method according to claim 21, wherein the compression molding process further comprises the steps of:

replacing the compression mold with another compression mold in which the intermediate multilayer is putted before heating the former,

compressing the latter mold to shape the intermediate multilayer into a molded multilayer article.

23. A method for manufacturing a molded multilayer article by molding a multilayer sheet consisting a plurality of polymer layers, said method comprising the steps of:

extruding a plurality of monolayers of molten polymers by forcing the molten polymers into a multiple T die combined with a plurality of T dies so that the molten polymers are extruded respectively through the T dies;

passing the monolayers extruded through the T dies through a space between a pair of nip rollers disposed opposite to each other;

forming an intermediate molten multilayer by superposing and laminating the monolayers outside the multiple T die by pressing the monolayers between the pair of rotating nip rollers while the polymers are in a molten state or a semi-molten state;

advancing the pair of nip rollers together with the multiple T die into a space between an open top half mold and a bottom half mold of a compression mold while a laminating operation of the pair of nip rollers is continued;

fixing a front end portion of the intermediate multilayer to one end of the bottom half mold of the compression mold;

moving the pair of nip rollers together with the multiple T die backward while a laminating operation of the pair of nip rollers is continued;

stopping the rotation of the pair of nip rollers and stopping the extrusion of the molten polymers while the pair of nip rollers are moved continuously backward in order to cut the intermediate molten multilayer; and

molding the intermediate molten multilayer molding in the compression mold into a multilayer article of a desired shape.

24. An apparatus for manufacturing a molded multilayer article by molding a multilayer sheet, said apparatus comprising:

a plastication means for separately plasticating polymers for forming each of monolayers, and feeding molten polymers by pressure;

a multiple T die combined with a plurality of T dies for extruding the monolayers and jointed to the plastication means;

moving means for moving the plastication means and the

multiple T die all together;

a laminating means provided with the multiple T die to form a intermediate molten multilayer by superposing and laminating the monolayers extruded in molten or semi-molten state;

a cutting means provided with the multiple T die for cutting the intermediate molten multilayer in a predetermined length; and

a compression molding means provided with a mold for molding the intermediate molten multilayer into a finished multilayer article of a desired shape.

25. The molded multilayer article manufacturing apparatus according to claim 24, wherein the plastication means are injection units included in an injection molding machine.

26. The molded multilayer article manufacturing apparatus according to claim 24, wherein the plastication means are extrusion units of an extruder.

27. The molded multilayer article manufacturing apparatus according to claim 24, wherein each of the T dies of the multiple T die is provided with a die slot opening adjusting means for adjusting the die slot opening to adjust the width of the monolayer to be extruded therethrough.

28. The molded multilayer article manufacturing apparatus according to claim 27, wherein the die slot opening length adjusting means comprises:

a pair of deckles disposed opposite to each other at the die slot opening of each of the T dies of the multiple T die so as to be movable toward and away from each other to adjust the length of the die slot opening;

servomotors for driving the pair of deckles for axial movement; and

ball screw mechanisms for converting output torques of the servomotors into longitudinal forces and transmitting the linear forces to the pair of deckles.

29. The molded multilayer article manufacturing apparatus according to claim 28 further comprising:

a data setting means for setting patterns regarding respective desired shapes for each of the monolayers of the multilayer article; and

a control means for controlling the respective positions of the deckles fitted on each T die to adjust the width of the monolayer extruded through the same T die on the basis of the data about the pattern of the shape of the same monolayer so that the same monolayer is formed in the desired shape.

30. The molded multilayer article manufacturing apparatus according to claim 29, wherein the control means executes an open-loop control operation.

31. The molded multilayer article manufacturing apparatus according to claim 30, wherein the control means comprises:

an arithmetic means for calculating position commands specifying respective positions of the deckles on the basis of the data about the patterns of the respective desired shapes of the monolayer; and

a controller for controlling the servomotors according to the position commands specifying positions of the deckles received from the arithmetic means.

32. The molded multilayer article manufacturing apparatus according to claim 29, wherein the control means executes a closed-loop control operation.

33. The molded multilayer article manufacturing apparatus according to claim 32, wherein the control means comprises:

an arithmetic means for calculating position commands specifying positions of the deckles on the basis of the data about the patterns of the predetermined shapes set by the data setting means;

a sensing means for detecting the respective positions of the deckles; and

a controller for comparing position feed back signals indicating

the respective positions of the deckles with the position commands and controlling the servomotors so that deviations of the deckle position signals from the position commands are reduced to zero.

34. The molded multilayer article manufacturing apparatus according to claim 29 further comprising a sequential control means for the sequential control of the plastication means, the die slot opening adjusting means, the cutting means, the laminating means, the moving means and the compression molding means on the basis of the patterns of the predetermined shape of monolayers of the multilayer article.

35. The molded multilayer article manufacturing apparatus according to claim 24, wherein the T dies of the multiple T die are so arranged that a thickest monolayer as the most below layer of the intermediate molten multilayer is extruded.

36. The molded multilayer article manufacturing apparatus according to claim 35, wherein the plastication means jointed to the T die through which the thickest monolayer is extruded is connected to the shortest passage among those connecting the plastication means to the T dies.

37. The molded multilayer article manufacturing apparatus according to claim 24, wherein the laminating means comprises:

a pair of nip rollers for forming a intermediate multilayer by superposing and pressing a plurality of monolayers extruded through the T dies, assembled integrally with the multiple T die so as to lie below the die slot openings of the T dies of the multiple T die;

driving means for driving the pair of nip rollers for rotation; and

actuators for moving the pair of nip rollers to press the nip rollers against the intermediate multilayers and to separate the same from the intermediate multilayers.

38. The molded multilayer article manufacturing apparatus according to claim 37, wherein the laminating means further

comprises a temperature regulating means for keeping the surfaces of the pair of nip rollers at a predetermined temperature.

39. The molded multilayer article manufacturing apparatus according to claim 37, wherein the laminating means further comprises scrapers for scraping off polymers adherent to the surfaces of the pair of nip rollers.

40. The molded multilayer article manufacturing apparatus according to claim 24, wherein the moving means comprises:

a base provided with the plastication means and the multiple T die and mounted movably on a bed; and

a means for moving the base between a standby position corresponding to a position where the multiple T die is held on standby, and a working position where the multiple T die advances into a space confined by a open top half mold and a bottom half mold of the compression mold in order to deliver the intermediate multilayer onto the bottom half mold.

41. The molded multilayer article manufacturing apparatus according to claim 24, wherein the cutting means is disposed integrally with the multiple T die, and is provided with a cutting member for cutting the intermediate molten multilayer at a position below the die slot openings of the T dies of the multiple T die.

42. The molded multilayer article manufacturing apparatus according to claim 41, wherein the cutting means comprises:

a pair of pad members for holding the intermediate molten multilayer therebetween;

a cutting member housed in one of the pair of pad members so as to be projected from the pad member toward the intermediate molten multilayer to cut it off along a line parallel to the width of the same;

a cooling means for cooling a portion of the intermediate molten multilayer in contact with the pair of the pad members;

actuators for pressing the pair of pad members against the intermediate molten multilayer and moving the same apart from it;

and

a cutter moving means for moving the cutting member along the width of the intermediate molten multilayer.

43. The molded multilayer article manufacturing apparatus according to claim 41, wherein the cutting means comprises:

a pair of pad members for holding the intermediate molten multilayer therebetween;

a cutting member housed in one of the pair of pad members so as to be projected from the pad member toward the intermediate molten multilayer to cut it off along a line parallel to the width of the same;

actuators for pressing the pad members against the intermediate molten multilayer and moving the same apart from it;

a heating means for heating the cutting member; and

a cutter operating means for projecting the cutting member from a surface of the pad member.

44. The molded multilayer article manufacturing apparatus according to claim 42 , wherein the pad members are internally provided with blowing means to blow air from inside thereof against the intermediate molten multilayer.

45. The molded multilayer article manufacturing apparatus according to claim 44, wherein the cutting member is a metal thin plate or a metal wire.

46. The molded multilayer article manufacturing apparatus according to claim 41, wherein the cutting means comprises:

a metal wire for cutting the intermediate molten multilayer ;

a wire extending means for extending the metal wire in a plane intersecting a plane including the intermediate molten multilayer so that the metal wire can be brought into contact with an exit of a slot opening of the respective T dies of the multiple T die open; and

a means for moving the wire extending means to move the metal wire along the exit of the slot opening of the T dies of the multiple T die.

47. The molded multilayer article manufacturing apparatus according to claim 46, wherein the cutting means further comprises:

a heating means for heating the metal wire;

a feed reel for feeding the metal wire; and

a take-up reel for taking up the metal wire.

48. The molded multilayer article manufacturing apparatus according to claim 46, wherein the metal wire is substituted by a metal thin plate bent so as to be able to be brought into contact with the exit of the slot opening of the T dies of the multiple T die.

49. The molded multilayer article manufacturing apparatus according to claim 41, wherein the cutting means comprises:

a cutting members for cutting the intermediate molten multilayer;

a support means for supporting the cutting means rollably so as to bring the cutting members of the cutting head into contact with the exit of the slot opening of the T dies of the multiple T die;

a moving means for moving the support means to move the cutting members along the exit of the slot opening of the T dies;

a guide means for guiding the support means for movement; and

a means for operating the cutting members so that the cutting members are kept in contact with the exit of the slot opening of the T dies while the cutting members are being moved for a cutting stroke to cut the intermediate molten multilayer, and the cutting members are kept apart from the exit of the slot opening of the T dies while the cutting members are being moved to its standby position for a return stroke.

50. The molded multilayer article manufacturing apparatus according to claim 49, wherein the means for operating the cutting means comprises:

a guide pin attached to one end of the support means;

a cam follower attached to one end of the swinging support means; and

an eccentric guide bar extended in parallel to the guide means, and provided with a cam groove to control the cam follower so that the cutting members are brought into contact with and kept apart from the exit of the slot opening of the T dies of the multiple T die.

51. The molded multilayer article manufacturing apparatus according to claim 24, wherein the compression molding means further comprises:

a mold clamping means for opening, closing the mold and clamping the closed mold;

a mold heating means for heating the mold to make the unfoamed polymer foam; and

a mold cooling means for cooling the mold.

52. The molded multilayer article manufacturing apparatus according to claim 51, wherein the compression molding means further comprises a mold changing means for changing the mold for another one.

53. The molded multilayer article manufacturing apparatus according to claim 52, wherein the compression molding means further comprises a fixing means for fixing a front end portion of the intermediate molten multilayer onto the mold.